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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/057,232	01/25/2002	David M. Lewis	306812002500	9737

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Thomas George  
Morrison & Foerster LLP  
755 Page Mill Road  
Palo Alto, CA 94304-1018

EXAMINER

MALSAWMA, LALRINFAMKIM HMAR

ART UNIT	PAPER NUMBER
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2825

DATE MAILED: 10/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/057,232

Applicant(s)

LEWIS ET AL.

Examiner

Lex Malsawma

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 January 2002.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 and 19-23 is/are rejected.
- 7) ☒ Claim(s) 18 and 24-35 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Specification***

1. The disclosure is objected to because of the following informalities:

On page 11, line 8 from the bottom, it seems “Fig. 6” should read “Fig. 9”; and

on page 12, line 7, it seems “H4 line 531” should read “H4 line 725”.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

#### ***Regarding Claim 1:***

In lines 7-8, the phrase, “having different logical lengths”, renders Claim 1 indefinite because it is not clear if the phrase should be interpreted to mean any or all of the following:

(1) the logical lengths of wires in said another first direction is different from the logical lengths of wires in said another second direction (e.g., would the second subset comprise H4 lines and V8 lines?);

(2) the plurality of wires within the second subset have different logical lengths, regardless of which direction (first or second) the wires are oriented (e.g., would the second subset comprise H4, H8, and V16 lines?, or H16, V4, and V8 lines?, etc.); and/or

(3) the logical lengths of wires within the second subset are different from the (first) logical length of the first subset.

Examiner interprets the phrase to mean any of the above.

*Regarding Claim 3:*

In lines 2 and 3, reference is made to “the wire”; however, the limitations in Claims 1 and 2 specify a plurality of wires; therefore, this claim is indefinite, since the second subset contains at least two wires (i.e., in Claim 1, the second subset would comprise at least one wire in said another first direction and at least a second wire in said another second direction).

*Regarding Claims 2 and 4-8:*

These claims are rejected as depending from an indefinite claim (i.e., Claim 1).

Any further rejections of, or indications of the allowability of, Claims 1-8 are based on Claim 1 as it is understood/interpreted by the Examiner.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 5, 6, 7(all as understood), 20, and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Agrawal et al. (5,490,074; hereinafter, “Agrawal”).

*Regarding Claims 1 and 7:*

Agrawal discloses a routing architecture, within a programmable logic device (PLD), to interconnect a plurality of function blocks (including at least a logic array block), comprising:

a plurality of wires of the routing architecture (Fig. 1, 4-6);

a first subset (e.g., note in Figs. 4-5, vertical bus lines 1-4 “V1-V4” and horizontal bus lines 1-4, “H1-H4”) of the plurality of wires oriented in a first and second direction having a first logical length; and

a second subset (e.g., in Figs. 4-5, V5-V14 and H5-H14) of the plurality of wires oriented in another first and second direction, the second subset having different logical lengths from that of the first subset,

wherein the first and second subset of the plurality of wires oriented in their respective first and second directions correspond to each other (i.e., all wires of the routing architecture would correspond to one another in some way, e.g., all wires correspond to one another since they all carry at least a minute amount of electrical current at some point during operation).

Therefore, these claims are anticipated.

*Regarding Claims 5 and 6:*

Agrawal discloses the first direction is orthogonal to the second direction, wherein the first direction and the second direction are horizontal and vertical directions.

*Regarding Claims 20 and 23:*

Agrawal discloses, within a PLD, a two-dimensional routing architecture to interconnect a plurality of function blocks, comprising:

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a first subset (vertical lines 1-4 in Fig. 4) of a plurality of wires having a first logical length and a physical length; and

a second subset (horizontal lines 1-4 in Fig. 5) of the plurality of wires having a second logical length and a physical length that is substantially the same as the physical length of the first subset of wires,

wherein the first logical length differs from the second logical length. In Figs. 1, 4, 5, and 60, vertical and horizontal long lines “1-4” extend across the entire chip; accordingly, the physical lengths of the vertical and horizontal long lines are substantially the same; and Fig. 60 shows that each CLB has a height longer than its width, therefore, the first (vertical) logical length differs from the second (horizontal) logical length. Therefore, this claim is anticipated.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 2, 3 (as understood), 9-17, 21, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Agrawal (5,490,074) in view of Young (5,818,730).

*Regarding Claims 2, 3, 21, and 22:*

Agrawal anticipates the PLD of Claim 1 but **lacks** disclosing that the second subset of wires is of an electrically optimum physical length to account for routing efficiency or for a pattern of connections to the wires. It is important to note that utilizing wires having an electrically optimum physical length, which accounts for at least routing efficiency, would be a common goal in the relevant art, especially as device-packing density increases. Young is **cited primarily to show** that routing efficiency and utilization of wires having electrically optimum physical lengths would be obvious features to implement into a PLD. Young discloses (in Col. 1 lines 39-52) it was well known in the art that routing efficiency of wires within a PLD is a critical (or at least desirable) aspect of PLD design; and in Col. 5 (lines 18-35), Young specifies one measure of routing efficiency and a means for achieving the routing efficiency. It would have been obvious to one of ordinary skill in the art to modify Agrawal by specifically reciting that the wires of the second subset have an electrically optimum physical length accounting for (at least) routing efficiency because Young teaches/shows that such features are desirable within a PLD and provides means for attaining such features. Furthermore, the limitations within the instant claims are considered to be generalized statements/features that could be attributed to almost any PLD (including Agrawal's PLD), since it would be a conventional design goal to

obtain a PLD having features such as optimized physical lengths, routing efficiencies, etc. (as shown by Young). Therefore, the instant claims are held obvious over the cited references.

*Regarding Claims 9-12:*

These claims are similar to Claims 2, 3, 6, and 7, which were addressed in detail above; therefore, they are held obvious over the cited references with reasoning similar to that applied to Claims 2, 3, 6, and 7.

*Regarding Claim 13:*

Agrawal discloses (in Fig. 60 and Col. 38, beginning in line 41) that each of the function blocks (e.g., CLBs or IOBs) has a height that differs from its width.

*Regarding Claims 15-17:*

These claims are essentially a method for acquiring the routing architecture of Claims 1-3, wherein all pertinent limitations within these claims can be found in Claims 1-3; therefore, these claims are held obvious over the cited references.

9. Claims 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Agrawal (5,490,074).

*Regarding Claim 4:*

Agrawal discloses (in Figs. 4 and 5) a plurality of vertical and horizontal lines, wherein numerous subsets (or combinations) of vertical and horizontal lines could be chosen to be the first subset, e.g., one could choose vertical long lines (1-4) and horizontal bi-directional-general-interconnect lines (5-9) as the first subset, wherein such a choice would provide vertical long lines with a physical length that is different from the horizontal bi-directional lines (note in Col.



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3, lines 58-60, the long lines span the entire chip; and in Col. 12, lines 56-61, the bi-directional lines span two configurable logic blocks, "CLB"). Therefore, it would have been an obvious matter of design choice for one of ordinary skill in the art to modify Agrawal by specifying a subset of wires comprising different physical lengths because Agrawal discloses various subsets of horizontal and vertical wires that could be readily chosen for the first subset of the currently claimed invention, wherein choosing vertical lines 1-4 and horizontal lines 5-9 discloses all limitations within the current claim.

*Regarding Claim 8:*

Agrawal's device would obviously be incorporated into a digital system, therefore, this claim is held obvious over Agrawal (if not anticipated).

***Allowable Subject Matter***

10. Claims 18 and 24-35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The references listed on the attached "Form PTO-892" are cited to show routing architectures having features similar to those of the current invention.

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12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lex Malsawma whose telephone number is 703-306-5986.

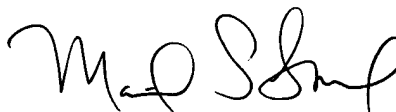
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 703-308-1323. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Lex Malsawma



September 29, 2003



MATTHEW SMITH  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800